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(54) IMPROVEMENTS RELATING TO PEST CONTROL APPARATUS

(71) I, VIVIAN JONES PHILLIPS of 26, Derwen Fawr Road, Sketty, Swansea, Glamorgan, a British subject, do hereby declare the invention, for which I pray that a Patent may be granted to me, and the method by which it is to be performed to be particularly described in and by the following statement:-

This invention relates to pest control apparatus.

The most common method of keeping garden pests at bay is to use chemicals which are either sprayed or distributed in pellet form. However, all poisons are hazardous and the intelligent slug can always avoid eating them.

It is an object of this invention to provide another sort of deterrent, more positive in its action.

According to the invention there is provided pest control apparatus comprising an elongate barrier presenting, in use, an upstanding obstacle to crawling pests, an exposed electrical conductor extending along said barrier on or surmounting a flank thereof which in use is positioned remote from the area to be protected, and means for connecting said conductor to one pole of a low voltage source to create an electric shock-giving zone which a crawling pest has to bridge in order to surmount the barrier.

By low voltage is meant in this specification that which might be obtained from a battery (4 volts is mentioned later as an example) and not mains or EHT voltages that are sometimes used to electrocute insects.

Means may be provided for earthing the other pole of said source so that said zone is defined by the earth adjacent the barrier. The apparatus will then work in some respects like a known electrical fence, but there is still a physical barrier which a crawling pest has to overcome, and in doing so it will bridge the gap between conductor and earth.

Preferably, however, at least one further exposed electrical conductor extends along the barrier, and means are provided for connecting this further conductor to the other pole of said source, said zone being that between conductors.

Conveniently the barrier comprises a foot portion for pushing in the ground and an upstanding portion for carrying the element or elements above ground. The barrier may be of various shapes in cross-section, for example, of inverted V-shape with outwardly extending flanges forming foot portions, of inverted T-shape with the cross bar of the T forming the foot portion and the stem the upstanding portion, or of L-shape with the horizontal part forming the foot portion and the vertical part the upstanding portion.

Rain could be a problem in short-circuiting the conductors. One way of mitigating this is for the surface of the barrier below the first conductor to have a discontinuity, for example in the form of an elongate projection or rib, a series of apertures, or an elongate member press fitted between two conductors. Alternatively, or in addition, the barrier may be surmounted by a canopy arranged to shield the conductors from rain. This canopy may be formed integrally with the barrier.

Earth may be used as well as two conductors on the barrier, in which case there will be means for establishing an electrical potential difference between each conductor and earth.

The barrier may be a plant or seed container, the conductors then being closed loops around the container. The barrier could also be mounted on a board, rigid sheet or platform.

In each case the connecting means may include at least one resistor as a current limiter.

For a better understanding of the inven-

tion some embodiments will now be described, by way of example, with reference to the accompanying drawing, in which:-

Figure 1 is a perspective view of one end of a pest barrier,

Figures 2 to 7 are cross-sections of other barriers,

Figure 8 is a diagrammatic plan view of a complete barrier system,

Figure 9 is a detailed vertical cross-section of another barrier, and

Figures 10 and 11 are perspective views of containers equipped with electrical barriers.

In Figure 1 the barrier provides a ridge 1 of inverted V-section with outwardly extending flanges 2 at the base which, in use, will be just buried in the earth. Extending along one flank of the ridge 1, on the exposed face, there are two conductors 3, 4 which themselves are exposed along their entire length. In use they are connected to a voltage source, for example a battery, and held at an electrical potential difference of, for example, 4 volts.

Between the conductors 3 and 4 there is an elongate rib 5 which provides a discontinuity in the flank of the ridge and acts as a drip ledge to prevent bridging of the conductors by rainwater. As well as electrical leakage, standing water between the conductors could cause erosion by electrolytic action. An alternative discontinuity (not shown) is a row of holes, or a separate strip that is a press fit between two projecting conductors.

A crawling pest attempting to get from one side to the other of the barrier has to surmount the ridge 1, and in so doing it will bridge the conductors 3 and 4 and be electrocuted.

Figure 2 shows an alternative barrier, of inverted T-section with the cross bar 6 providing a buried foot, and the stem 7 upstanding above the ground. Conductors 8 and 9 extend along opposite sides of the stem 7 just below the upper edge. This is shown surmounted by a canopy 10 supported on the upper edge by clips 11. This shields the conductors from rain but allows a slug, for example, to try to work itself over the upper edge.

The barrier of Figure 3 is of L-section, the horizontal part 12 forming the buried foot and the vertical part 13 having a conductor 14 along its upper edge and the second conductor 15 below it. Alternatively, the conductor 14 might be fixed below that edge on the same or opposite side as the conductor 15. A rain canopy could again be provided, even with a conductor on the top edge.

Figure 4 shows another L-section barrier with a foot 16 and an upstanding portion 17 having a single conductor 18. At the upper edge of the portion 17 there is a downwardly projecting flange 19 which shields the conductor. A potential difference is established between the conductor 18 and earth, for example, by means of one or more spikes 20 inserted in the earth, adjacent the barrier.

Figure 5 shows a barrier with three conductors 21, 22 and 23 mounted on an inverted T-section member. The conductors 21 and 22 are on opposite sides of the stem 24 and are held at the same potential, while conductor 23 along the top edge is at a different one.

Figure 6 shows an L-section barrier with two conductors 25, 26 along one side, each held at a different potential from each other and from earth, an earth spike 27 being inserted in the ground adjacent the barrier and connected in circuit as shown.

Figure 7 shows an alternative method of establishing potential difference between earth and the conductors 25 and 26. It also shows an example of a press-fit strip 28 providing a rainwater barrier, the strip being of T-section with its stem between the conductors and its cross bar domed on the exposed face and marginally overlapping the conductors.

In Figures 6 and 7 resistors are shown in circuit with the battery. These will normally be provided in any arrangement as a current limiter, although more sophisticated means could be used.

When a row of plants has to be protected there will have to be a completely surrounding barrier. It will generally be convenient to manufacture any of the above described barriers in modular lengths which can be clipped together, at the same time establishing electrical connection between the respective conductors. Corner pieces may also be provided. Thus, a lay-out as diagrammatically illustrated in Figure 8 may be assembled. If there are a number of barrier enclosures they may all be connected to the same voltage source 29, as shown.

Conveniently the barriers are extrusions of plastics material and the conductors, which may, for example, be rods, wires, tapes, plates or strips of any good electrically conductive material, including carbon, may be attached to the plastics by, for example, adhesive, rivets, screws, bolts or clips. Alternatively, they may be moulded into the plastics material. This will, of course, be electrically insulating, and as a water repellent it is best that it should have a shiny finish. But the barriers could be of other material, even of electrically conductive metal. This might have a complete insulating coating, or only a partial one along the zone of the or each conductor. In this latter case the barrier itself can form one of the conductors. The attached conductor 30 may simply be crimped into a longitudinal fold 31 in the sheet metal strip

32 forming the barrier, with an insulating strip 33 interposed, as illustrated in Figure 9.

The barriers need not necessarily be straight; they may be curved into partial or complete circles for example. A particular instance of this is to have two conductor rings 34, 35 around a flower pot 36, as shown in Figure 10. Similar protection can be given to any other plant or seed container, such as the seed tray 37 in Figure 11, which has conductors 38, 39 in closed rectangular loops.

The barrier can be mounted on boards, with drainage holes. These can be used outside where the weight of the boards does not entail any burying operation, or in a greenhouse, for example, where they can be set down on the staging. The boards can be made up into platforms or trays, or the barriers may be mounted around a single perforated rigid sheet, to form a tray for plant pots and the like.

Although DC voltage has been indicated, AC could be used or a pulsed or other form of voltage. It may be possible to dispense with a battery, and to use two rods or plates of dissimilar metals sunk into the ground. The resulting electrolytic action could provide the necessary voltage.

Although reference was made about electrocuting pests, it is doubtful that many would actually be killed. However, their body fluids, which are conductive, will generally ensure that they will receive a considerable shock which will deter them from further progress. Indeed it may be preferred not to kill, since a corpse left bridging the conductors would reduce the efficiency of the device.

Although only one, two or three conductors have been described, it is possible to have even more, in a parallel array, and conveniently the first, third, fifth and so on will all be at one potential and the alternating second, fourth, sixth and so on will be at another.

WHAT I CLAIM IS:-

1. Pest control apparatus comprising an elongate barrier presenting, in use, an upstanding obstacle to crawling pests, an exposed electrical conductor extending along said barrier on or surmounting a flank thereof which in use is positioned remote from the area to be protected, and means for connecting said conductor to one pole of a low voltage source to create an electric shock-giving zone which a crawling pest has to bridge in order to surmount the barrier.

2. Apparatus as claimed in Claim 1, wherein means are provided for earthing the other pole of said source so that said zone is defined by earth adjacent the barrier and said conductor.

3. Apparatus as claimed in Claim 1, wherein at least one further exposed electrical conductor extends along the barrier and means are provided for connecting this further conductor to the other pole of said source, said zone being that between the conductors.

4. Apparatus as claimed in Claim 3, including means for establishing an electrical potential difference between each conductor and earth.

5. Apparatus as claimed in any preceding claim, wherein the barrier comprises a foot portion for burying in the ground and an upstanding portion for carrying said conductor or conductors above ground.

6. Apparatus as claimed in Claim 5, wherein the barrier is, in cross-section, of inverted V-shape with outwardly extending flanges forming foot portions.

7. Apparatus as claimed in Claim 5, wherein the barrier is, in cross-section, of inverted T-shape, with the crossbar of the T forming the foot portion and the stem the upstanding portion.

8. Apparatus as claimed in Claim 5, wherein the barrier is, in cross-section, of L-shape, with the horizontal part forming the foot portion and the vertical part the upstanding portion.

9. Apparatus as claimed in any preceding claim, wherein the surface of the barrier below the first conductor has a discontinuity.

10. Apparatus as claimed in Claim 9, wherein the discontinuity is an elongate projection or rib.

11. Apparatus as claimed in Claim 9, wherein the discontinuity is a series of apertures.

12. Apparatus as claimed in Claim 9 as appendant to Claim 3, wherein the discontinuity is an elongate member which is press-fitted between two conductors.

13. Apparatus as claimed in any preceding claim, wherein the barrier is surmounted by a canopy arranged to shield the conductor(s) from rain.

14. Apparatus as claimed in Claim 12, wherein the canopy is formed integrally with the barrier.

15. Apparatus as claimed in Claim 3, wherein the barrier is a plant or seed container, such as a flower pot or seed tray, and the conductors are closed loops around the container.

16. Apparatus as claimed in Claim 3, wherein the barrier is mounted on a board, rigid sheet, or platform.

17. Apparatus as claimed in any preceding claim, wherein the connecting means includes current limiting means.

18. A pest control system comprising a plurality of apparatus as claimed in any preceding claim, the barriers being secured end-to-end in a loop with the conductor or

respective conductors completing associated loops and being connected to a single said voltage source.

19. Pest control apparatus substantially as hereinbefore described with reference to the accompanying drawing.

WYNNE-JONES, LAINÉ & JAMES,
Chartered Patent Agents,
33, St. Mary Street,
Cardiff CF1 2AB.
Agents for the Applicant

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Sheet 1

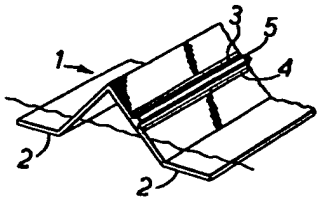

FIG. 1.

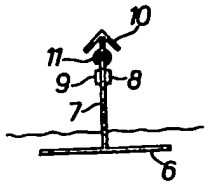

FIG. 2.

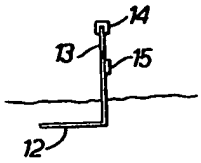

FIG. 3.

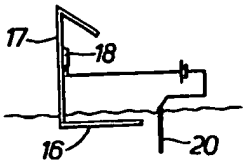

FIG. 4.

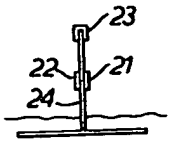

FIG. 5.

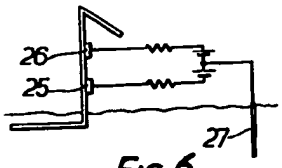

FIG. 6.

1604155 COMPLETE SPECIFICATION
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Sheet 2

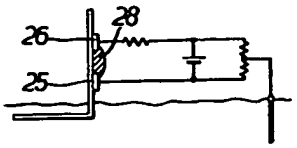

FIG. 7.

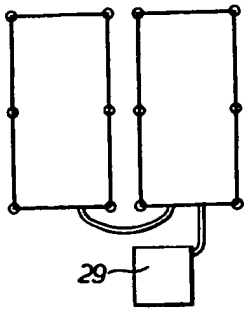

FIG. 8.

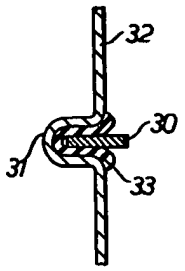

FIG. 9.

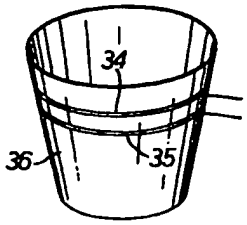

FIG. 10.

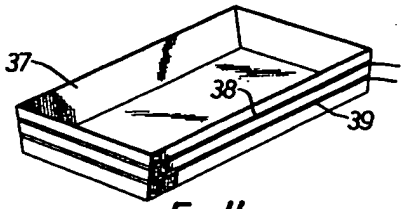

FIG. 11.